H I L G A R D I A

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AN ANNOTATED LIST AND BIBLIOGRAPHY OF INSECTS REPORTED TO HAVE VIRUS DISEASES[1]

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NO COMPREHENSIVE listing of the insects reported to be affected by viruses has been made for a number of years. In 1915, Chapman and Glaser (47)[3] published a list of insects having "wilt." Revised listings based on Chapman and Glaser's work, and including additional entries, have been made by Sweetman (198), Bergold (7), and Steinhaus (185). Recent years have produced so much new information on the virus diseases of insects [Martignoni (125) reported that in 1954 more than 150 insect species were known to suffer from virus diseases] that all the above lists are now quite incomplete.

In the list presented here an attempt has been made to include all published reports of virus infections in insects, regardless of the validity of such reports. There are certainly many entries of questionable authenticity, but their evaluation is left to the judgment of those who may find the listing useful.

A notation as to the type of virus disease was included in nearly all entries. An attempt was made to distinguish between the nuclear polyhedroses and the cytoplasmic polyhedroses whenever the information available in the literature permitted such a distinction. Those cases in which a polyhedrosis is involved, but without evidence to indicate the type of polyhedrosis, were recorded simply as "polyhedrosis." The bibliography is not a complete listing of all literature in which reference is made to a virus disease of an insect, but it is hoped that none of the principal publications has been overlooked.

The scientific and common names used agree with those found in "Common Names of Insects Approved by the Entomological Society of America" (Amer. Ent. Soc. Bul. vol. 1, no. 4, December, 1955). Common names of some of the species not included in the above listing were obtained from "Catalogue of injurious insects in Japan" by T. Shiraki (Economic and Scientific Section, Natural Resources Division, Supreme Commander for the Allied Powers, Tokyo, 1952, 7 vols.), and from the publication or publications referred to in the text by number.

[1] Contribution from the Laboratory of Insect Pathology, Department of Biological Control, University of California, Berkeley. Originally submitted for publication June 8, 1956.

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[3] See "Literature Cited" for citations referred to in the text by number. The survey of the literature pertaining to this paper was completed in January, 1957.

The scientific names of those species not included in the list approved by the Entomological Society of America agree with those found in the following publications:

Genus *Neodiprion:* Ross, H. H. The taxonomy and evolution of the sawfly genus *Neodiprion;* Forest Science **1**:196–209, 1956.

Various orders: Schenkling, S., ed. Coleopterorum catalogus; 1910–1939. Bryk, F., ed. Lepidopterorum catalogus; 1911–1938. Hedicke, H., ed. Hymenopterorum catalogus; 1936–1938 (the three published by W. Junk, Verlag für Entomologie, 's Gravenhage). Muesebeck, C. F. W., K. V. Krombein and H. K. Townes, eds. Hymenoptera of America North of Mexico; synoptic catalog; U.S.D.A., Agricultural Monograph, Washington, 1951. Lindner, E. Die Fliegen der Palaearktischen Region; Schweizerbart'sche Verlagsbuchhandlung, 1930 and later.

Class Insecta: Kloet, G. S., and W. D. Hincks. A check list of British insects; Buncle Co., Ltd., Arbroath, 1945. Wu, C. F. Catalogus insectorum sinensium; The Fan Memorial Institute of Biology, Peiping, 1935–1941.

In some instances, synonyms are also given; they are quoted in parentheses, following the valid name of the species. Subgeneric names (where necessary) are in parentheses, after the generic name. The family designations agree with those used in "Common Names of Insects Approved by the Entomological Society of America," with the addition of two (Anthelidae and Thaumetopoeidae) which do not occur in that list. Families are arranged alphabetically within the orders.

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LEPIDOPTERA

AGROTIDAE

(See PHALAENIDAE)

ANTHELIDAE

Pterolocera amplicornis Wlk.
Nuclear polyhedrosis (59)

ANTHROCERIDAE

(See ZYGAENIDAE)

ARCTIIDAE

Apantesis virgo (L.)
Polyhedrosis (7, 182, 185, 198, 254)
Arctia caja (L.), great tiger moth
Nuclear polyhedrosis (16, 18, 169, 170, 172, 185)
Cytoplasmic polyhedrosis, in mixed infection with nuclear polyhedrosis, apparently as a result of cross-infection with polyhedra from *Vanessa cardui* (169, 170, 172)
Arctia villica (L.), cream-spot tiger moth
Cytoplasmic polyhedrosis (16, 18, 163, 169, 170, 175, 244)
Cycnia mendica (Clerck), muslin moth
Nuclear polyhedrosis (163, 171)
Diacrisia purpurata (L.)
Nuclear polyhedrosis (16, 18, 169, 244)
Cytoplasmic polyhedrosis (163, 169, 170, 244)
Estigmene acrea (Drury), salt-marsh caterpillar
Polyhedrosis (185)
Granulosis (18, 185, 186, 187, 190, 195, 254)
Euplagia quadripunctaria (Poda), Jersey tiger moth
Cytoplasmic polyhedrosis (170)
Hyphantria cunea (Drury), fall webworm
Virus disease, not further identified (92)
Polyhedrosis (7, 47, 182, 185, 198, 220, 254)
Hypocrita jacobaeae (L.), cinnabar moth
Nuclear polyhedrosis, apparently as a result of cross-infection with polyhedra from *Panaxia dominula* (128, 171, 185)
Panaxia dominula (L.), scarlet tiger moth
Nuclear polyhedrosis (169, 170, 171, 246)
Phragmatobia fuliginosa (L.), ruby tiger moth
Polyhedrosis (170)

BOMBYCIDAE

Bombyx mori (L.), silkworm
Nuclear polyhedrosis (7, 8, 9, 13, 16, 17, 18, 19, 20, 21, 23, 62, 63, 65, 68, 81, 83, 84, 85, 107, 129, 133, 136, 144, 149, 173, 174, 185, 186, 189, 190, 191, 191*d*, 214, 234, 242, 247, 248, 249, 250, 251, 252, 253, 254)

Cytoplasmic polyhedrosis, naturally occurring, and apparently as a result of cross-infection with polyhedra from several other insects (18, 172, 215, 244)

A poorly defined group of diseases, including those known as flacherie and gattine, believed by Paillot to result from infection by a virus and a bacterium (134, 135, 136, 142, 185)

DIOPTIDAE

Phryganidia californica Pack., California oakworm
Nuclear polyhedrosis (7, 18, 47, 182, 185, 186, 187, 188, 190, 198, 254)

EPIPASCHIIDAE

Tetralopha scortealis (Led.), lespedeza webworm
Polyhedrosis (192)

GALLERIIDAE

Galleria mellonella (L.), greater wax moth
Polyhedrosis (156)

GELECHIIDAE

(See also OECOPHORIDAE)
Recurvaria milleri Busck, lodgepole needle miner
Granulosis (192)

GEOMETRIDAE

Abraxas grossulariata (L.), currant moth
Nuclear polyhedrosis (169, 170, 174, 246)
Cytoplasmic polyhedrosis (175)
Biston betularia (L.), pepper and salt moth
Cytoplasmic polyhedrosis (168)
Biston robustum Butler, giant geometrid
Virus disease, not further identified (92)
Bupalus piniarius (L.)
Nuclear polyhedrosis (7, 47, 182, 185, 198, 241, 254)
Cytoplasmic polyhedrosis, naturally occurring, and apparently as a result of cross-infection with the polyhedra of *Vanessa cardui* (168)
Ennomos quercinaria (Hufn.)
Nuclear polyhedrosis (102)
Lambdina fiscellaria fiscellaria (Guen.), hemlock looper
Virus disease, not further identified (45)
Lambdina fiscellaria lugubrosa (Hulst), western hemlock looper
Polyhedrosis (182, 185, 187, 254)
Lambdina fiscellaria somniaria (Hulst), western oak looper
Polyhedrosis (185)
Nepytia canosaria (Wlk.), false hemlock looper
Polyhedrosis (185)

Operophtera brumata (L.), winter moth
Cytoplasmic polyhedrosis, apparently as the result of cross-infection with polyhedra from *Vanessa cardui* (168)
Oporinia autumnata (Borkh.), larch looper
Nuclear polyhedrosis (124)
Ptychopoda seriata (Schrk.) (=*Sterrha seriata* Schrk.)
Polyhedrosis (7, 16, 18, 185, 242)
Sabulodes caberata Guen., omnivorous looper
Polyhedrosis (192)
Granulosis (18, 99, 101, 186, 187, 190)

LASIOCAMPIDAE

Dendrolimus pini L.
Polyhedrosis, naturally occurring and apparently as a result of cross-infection with polyhedra from *Bombyx mori, Lymantria monacha* and *Porthetria dispar* (7, 18, 185)
Dendrolimus spectabilis Butler, pine caterpillar
Virus disease, not further identified (92)
Kunugia yamadai Nagano, Yamada lasiocampid
Virus disease, not further identified (92)
Malacosoma americanum (F.), eastern tent caterpillar
Polyhedrosis (7, 18, 22, 47, 81, 82, 97, 182, 185, 187, 198, 242, 254)
Malacosoma disstria Hbn., forest tent caterpillar
Nuclear polyhedrosis (7, 16, 18, 22, 47, 82, 150, 182, 185, 186, 254)
Malacosoma fragile (Stretch), Great Basin tent caterpillar
Nuclear polyhedrosis (49, 50, 51, 53, 187, 191*a*)
Malacosoma neustria (L.)
Polyhedrosis (7, 18)
Possible virus disease of the *Paillotella* type (4, 18)
Malacosoma pluviale (Dyar), western tent caterpillar
Nuclear polyhedrosis (18, 22, 186, 187)
Metanastria undans (Wlk.), chestnut-leaved oak caterpillar
Virus disease, not further identified (92)

LIMACODIDAE

Narosa conspersa Wlk.
Possible virus disease described as a "wilt disease" in the literature (109, 185)
Natada nararia (Moore) [=*Susica nararia* (Moore)]
Granulosis; reports of a "wilt disease" probably refer to this (109, 164, 175, 185)
Niphadolepis alianta Karsch
Possible virus disease described as a "wilt disease" in the literature (161, 185)
Parasa lepida (Cram.)
Possible virus disease described as a "wilt disease" in the literature (109, 185)

Spatulifimbria castaneiceps Hamps.
Possible virus disease described as a "wilt disease" in the literature (109, 185)
Thosea cana Wlk.
Possible virus disease described as a "wilt disease" in the literature (109, 185)
Thosea cervina Moore
Possible virus disease described as a "wilt disease" in the literature (109, 185)
Thosea recta Hamps.
Possible virus disease described as a "wilt disease" in the literature (109, 185)

LYCAENIDAE

Lycaena phlaeas (L.), small copper butterfly
Cytoplasmic polyhedrosis, apparently as a result of cross-infection with polyhedra from *Vanessa cardui* (172)

LYMANTRIIDAE

Dasychira pseudabietis (Butler), Japanese cedar tussock moth
Virus disease, not further identified (92)
Dasychira pudibunda (L.)
Polyhedrosis (112, 113, 185)
Dasychira selenitica (Esp.)
Polyhedrosis (118, 185)
Euproctis chrysorrhea (L.), brown-tail moth
Cytoplasmic polyhedrosis (168)
Euproctis terminalis (Wlk.), pine brown-tail moth
Polyhedrosis (185, 212)
Hemerocampa leucostigma (J. E. Smith), white-marked tussock moth
Polyhedrosis (7, 47, 182, 185, 198, 254)
Hemerocampa pseudotsugata McD., Douglas-fir tussock moth
Polyhedrosis (73, 185, 187)
Lymantria fumida Butler, red belly tussock moth
Virus disease, not further identified (92)
Lymantria monacha (L.), nun moth
Nuclear polyhedrosis (7, 9, 15, 16, 18, 19, 21, 38, 71, 72, 93, 96, 111, 130, 153, 170, 174, 186, 189, 190, 191*a*,*d*, 223, 224, 225, 226, 242, 254)
Nygmia phaeorrhoea (Donov.), brown-tail moth
Polyhedrosis (185, 255)
Orgyia antiqua (L.), rusty tussock moth
Polyhedrosis (7, 47, 182, 185, 198, 254)
Porthetria dispar (L.), gypsy moth
Nuclear polyhedrosis (7, 8, 9, 10, 13, 15, 16, 18, 19, 21, 47, 48, 79, 80, 81, 82, 92, 96, 129, 170, 174, 185, 186, 189, 190, 191*a*, 198, 242, 254)
Cytoplasmic polyhedrosis, apparently as a result of cross-infection with polyhedra from another insect; not clear whether the insect was *Diacrisia purpurata, Arctia villica* or *Sphinx ligustri* (244)

Stilpnotia salicis (L.) satin moth
Polyhedrosis (78, 185, 233)

MEGALOPYGIDAE

Megalopyge opercularis (J. E. Smith), puss caterpillar
Granulosis (192)

NOCTUIDAE

(See PHALAENIDAE)

NOTODONTIDAE

Cerura hermelina (Goeze) [=*Cerura bifida* (Hbn.)]
Polyhedrosis (7, 47, 182, 185, 198, 254)
Heterocampa guttivitta (Wlk.), saddled prominent
Polyhedrosis (7, 47, 55, 182, 185, 198, 254)
Phalera bucephala (L.), buff tip moth
Nuclear polyhedrosis, apparently as a result of cross-infection with polyhedra from *Vanessa cardui* (172)
Cytoplasmic polyhedrosis, apparently as a result of cross-infection with polyhedra from *Vanessa cardui* (172)
Stauropus alternus Wlk.
Polyhedrosis (185)

NYMPHALIDAE

Aglais urticae (L.), small tortoiseshell butterfly
Nuclear polyhedrosis; naturally occurring, and apparently as a result of cross-infection with polyhedra from *Vanessa cardui* (7, 75, 138, 140, 172, 182, 185, 254)
Cytoplasmic polyhedrosis, in mixed infection with nuclear polyhedrosis, apparently as a result of cross-infection with polyhedra from *Vanessa cardui* (171, 172, 244)
Argynnis lathonia (L.)
Polyhedrosis (54, 185)
Argynnis pandora Schiff.
Polyhedrosis (75)
Argynnis paphia (L.)
Polyhedrosis (75)
Charaxes jasius (L.)
Polyhedrosis (74, 75)
Junonia coenia Hbn., buckeye
Polyhedrosis (192)
Granulosis (18, 185, 186, 187, 190, 195, 254)
Nymphalis antiopa (L.)
Polyhedrosis (76)
Nymphalis io (L.), peacock butterfly
Nuclear polyhedrosis; naturally occurring and apparently as a result of cross-infection with polyhedra from *Vanessa cardui* (74, 172)

Cytoplasmic polyhedrosis, apparently as a result of cross-infection with polyhedra from *Diacrisia purpurata* and *Vanessa cardui* (171, 172, 244)

Nymphalis polychloros (L.)
Polyhedrosis (76)

Vanessa atalanta (L.), red-admiral
Nuclear polyhedrosis (246)

Vanessa cardui (L.), painted lady butterfly
Nuclear polyhedrosis (75, 163, 172, 177, 187, 203)
Cytoplasmic polyhedrosis, apparently mixed with nuclear polyhedrosis (163, 172)

Vanessa tammeamea Esch., Kamehameha butterfly
Probable polyhedrosis (208, 239)

OECOPHORIDAE

Diurnea fagella (Schiff.) [=*Chimbace fagella* (Schiff.)]
Polyhedrosis (91, 182, 185, 254)

OLETHREUTIDAE

Carpocapsa pomonella (L.), codling moth
Polyhedrosis (158, 159, 185)

Eucosma griseana (Hbn.) [=*Eucosma diniana* (Guen.)], gray larch tortrix, larch bud moth
Virus disease, not further identified (92)
Polyhedrosis; some or all of these reports probably based on the granulosis noted below (61, 105, 106, 185)
Granulosis (124, 126)

Spilonota ocellana (D. & S.), eye-spotted bud moth
Nuclear polyhedrosis (197)

PHALAENIDAE

Agrotis segetum (Schiff.), turnipmoth or cutworm
Nuclear polyhedrosis (18, 140, 185, 254)
Cytoplasmic polyhedrosis (168)
Granulosis (137, 138, 140, 141, 187, 254)

Alabama argillacea (Hbn.), cotton leafworm
Polyhedrosis (7, 47, 182, 185, 198, 254)

Anticarsia gemmatilis Hbn., velvetbean caterpillar
Polyhedrosis (192). A mixture of disintegrating specimens of *Anticarsia gemmatilis* and *Xylomyges* sp. was found filled with polyhedra. Either or both of these species may have been infected.

Autographa biloba Steph.
Polyhedrosis (3, 185)

Autographa californica (Speyer), alfalfa looper
Nuclear polyhedrosis (7, 47, 90, 103, 182, 185, 198, 254)
Granulosis (90)

Catabena esula Druce
Polyhedrosis (203)

Chorizagrotis auxiliaris (Grote), army cutworm
Polyhedrosis (192)
Granulosis (192)
Diataraxia oleracea (L.), tomato moth
Cytoplasmic polyhedrosis (168)
Euplexia lucipara (L.), small angleshades moth
Granulosis (168)
Euxoa ochrogaster (Guen.), red-backed cutworm
Disease of unknown etiology, possibly a polyhedrosis (110, 185)
Heliothis phloxiphaga Grt. & Rob.
Polyhedrosis (185)
Heliothis virescens (F.), tobacco budworm
Polyhedrosis (192)
Heliothis zea (Boddie), corn earworm, bollworm, tomato fruitworm
Nuclear polyhedrosis (7, 47, 168, 180, 182, 185, 198, 254)
Cytoplasmic polyhedrosis (168)
Laphygma exempta (Wlk.)
Virus disease, not further identified (147, 240, 208)
Laphygma exigua (Hbn.), beet armyworm
Nuclear polyhedrosis (18, 186, 187, 188)
Granulosis (192)
Laphygma frugiperda (J. E. Smith), fall armyworm
Polyhedrosis (2, 7, 47, 182, 185, 198, 254)
Granulosis (192)
Mamestra brassicae (L.), cabbage armyworm
Virus disease, not further identified (92)
Melanchra persicariae (L.), dot moth
Granulosis (168)
Moma champa Moore, yellow belly dagger moth
Virus disease, not further identified (92)
Nephelodes emmedonia (Cram.), bronzed cutworm
Polyhedrosis (182, 185, 192, 227, 254)
Granulosis (192)
Panolis flammea Schiff., pine moth
Polyhedrosis (7, 152, 160, 185)
Peridroma margaritosa (Haw.), variegated cutworm
Polyhedrosis (192)
Granulosis (16, 18, 183, 185, 186, 187, 190, 194, 195, 254)
Persectania ewingi Wwd., New Zealand armyworm
Granulosis (121)
Phlogophora meticulosa (L.), angleshades moth
Nuclear polyhedrosis; apparently as a result of cross-infection with polyhedra from *Sphinx ligustri;* also, in mixed infection with cytoplasmic polyhedrosis as a result of cross-infection with polyhedra from *Vanessa cardui* (163, 172, 174)
Cytoplasmic polyhedrosis, apparently as a result of cross-infection with cytoplasmic polyhedra from *Arctia villica;* also in mixed infection

with nuclear polyhedrosis as a result of cross-infection with polyhedra from *Vanessa cardui* (163, 172, 175)

Plusia gamma (L.)
Nuclear polyhedrosis (116)

Prodenia litura (F.)
Polyhedrosis (44, 69, 185)

Prodenia ornithogalli Guen., yellow-striped armyworm
Polyhedrosis (185)

Prodenia praefica Grote, western yellow-striped armyworm
Nuclear polyhedrosis (18, 33, 46, 98, 185, 186, 187, 188, 190, 254)

Pseudaletia unipuncta (Haw.), armyworm
Nuclear polyhedrosis (7, 47, 58, 182, 185, 187, 191*d*, 198, 202, 203, 206, 254)
Granulosis (201, 202, 203, 206)
Noninclusion virus disease (18, 228)

Rachiplusia nu Guen.
Polyhedrosis (192)

Spaelotis clandestina (Harr.), W-marked cutworm
Polyhedrosis (7, 182, 185, 198, 254)

Spodoptera mauritia (Bdv.)
Polyhedrosis (207)

Trichoplusia ni (Hbn.) (=*Plusia brassicae* Riley), cabbage looper
Nuclear polyhedrosis (7, 47, 182, 185, 198, 254)

Triphaena pronuba (L.), yellow underwing
Cytoplasmic polyhedrosis (168)

PHALONIIDAE

Clysiana ambiguella (Hbn.)
Polyhedrosis (7, 47, 182, 185, 198, 254)

PHYCITIDAE

Dioryctria splendidella H. S., larger pine shoot borer
Virus disease, not further identified (92)

PIERIDAE

Aporia crataegi (L.), black-veined white butterfly
Nuclear polyhedrosis (114, 123, 185)
Cytoplasmic polyhedrosis (168)

Colias chrysotheme chrysotheme Esp.
Polyhedrosis (7)

Colias electo L., lucerne caterpillar
Polyhedrosis (120, 122, 162, 185)

Colias lesbia (F.)
Nuclear polyhedrosis; apparently identical with virus affecting *Colias philodice eurytheme* (188)

Colias philodice eurytheme Bdv., alfalfa caterpillar
Nuclear polyhedrosis (7, 16, 18, 40, 46, 47, 52, 60, 98, 100, 127, 179, 181,

182, 184, 185, 186, 187, 188, 189, 190, 191*a,b,c*, 198, 210, 211, 237, 238, 242, 254)

Colias philodice philodice Latr., clouded sulphur butterfly
Polyhedrosis (7, 47, 182, 185, 198)

Pieris brassicae (L.), European cabbage butterfly
Granulosis (131, 133, 185, 219, 254)
Possible virus disease with formation of polymorphic inclusion bodies (131, 132, 133, 143, 168, 185, 189, 190, 254)

Pieris rapae (L.), imported cabbageworm
Nuclear polyhedrosis; result of cross-infection with polyhedra from *Colias philodice eurytheme;* earlier reports of a naturally occurring disease (7, 95, 168, 182, 185, 188, 198, 199, 200, 254)
Granulosis (18, 187, 199, 200, 204, 205, 208, 209)

PSYCHIDAE

Cryptothelea junodi (Heylaerts) [=*Acanthopsyche junodi* (Heylaerts)], wattle bagworm
Nuclear polyhedrosis (168, 185)

PYRALIDIDAE

Dichocrocis punctiferalis (Guen.), peach pyralid moth
Virus disease, not further identified (92)

PYRAUSTIDAE

Blepharomastix acutangulalis (Snellen)
Polyhedrosis (203)

Omiodes blackburni (Butler), coconut leaf roller
Virus disease, not further identified (104, 208)

SATURNIIDAE

Antherea paphia (L.), tasar silkworm
Polyhedrosis; also reported to be susceptible to virus of *Bombyx mori* polyhedrosis (7, 36, 47, 182, 185, 198, 254)

Antheraea pernyi Guér.-Men., Chinese oak silkworm
Polyhedrosis; also reported to be susceptible to virus of *Bombyx mori* polyhedrosis (7, 35, 36, 47, 182, 185, 198, 254)

Antheraea polyphemus (Cram.), polyphemus moth
Polyhedrosis (18, 170, 171)

Antheraea yamamai Guér.-Men., Japanese oak silkworm
Polyhedrosis; also reported to be susceptible to virus of *Bombyx mori* polyhedrosis (7, 35, 36, 47, 182, 185, 198, 254)

Coloradia pandora Blake, pandora moth
Polyhedrosis (185, 187, 243)

Hemileuca maia (Drury), buck moth
Polyhedrosis (7, 182, 185, 198, 254)

Hemileuca oliviae Ckll., range caterpillar
Polyhedrosis (7, 47, 182, 185, 198, 254)

Hemileuca tricolor (Pack.)
Polyhedrosis (192)

Nudaurelia cytherea (F.), pine tree emperor moth
Polyhedrosis (185, 213)
Samia cynthia (Drury) (=*Philosamia cynthia* Drury), cynthia moth
Polyhedrosis; naturally occurring, and apparently as a result of cross-infection with polyhedra from *Bombyx mori* and *Vanessa cardui* (7, 36, 47, 107, 172, 182, 185, 188, 198, 254)
Cytoplasmic polyhedrosis, apparently as a result of cross-infection with polyhedra from *Vanessa cardui* (172)
Samia ricini (Bdv.), Arrindy silkworm
Polyhedrosis, apparently as a result of cross-infection with polyhedra from *Bombyx mori* (1, 177, 222)
Saturnia pyri (Schiff.) [=*Saturnia pavonia major* (L.)]
Polyhedrosis (7, 47, 56, 182, 185, 198, 254)

SATYRIDAE

Dira megera (L.), wall butterfly
Cytoplasmic polyhedrosis and possible nuclear polyhedrosis; a condition similar to that cited for *Pararge aegeria* (172)
Pararge aegeria (L.), speckled wood butterfly
Cytoplasmic polyhedrosis; apparently as a result of cross-infection with polyhedra from *Vanessa cardui;* also a nuclear polyhedrosis possibly present (172)

SPHINGIDAE

Celerio euphorbiae (L.), spurge hawk moth
Polyhedrosis (7, 34, 185)
Celerio galii (von Rott.), madder hawk moth
Polyhedrosis (7, 34, 185)
Celerio harmuthi (Kordesch) [=*Celerio euphorbiae* (L.) ♂ × *Deilephila elpenor* (L.) ♀]
Polyhedrosis (34, 185)
Celerio kindervateri Kys. [=*Celerio euphorbiae* (L.) ♂ × *Celerio galii* (von Rott.) ♀]
Polyhedrosis (34, 185)
Celerio phileuphorbiae Mütz. [=*Celerio galii* (von Rott.) ♂ × *Celerio euphorbiae* (L.) ♀]
Polyhedrosis (34, 185)
Celerio vespertilio (Esp.)
Polyhedrosis (7, 34, 185)
Deilephila elpenor (L.)
Polyhedrosis (7, 34, 185)
Laothoe populi (L.), poplar hawk moth
Nuclear polyhedrosis, apparently as a result of cross-infection with polyhedra from *Vanessa cardui* (172)
Proserpinus proserpina (Pall.)
Polyhedrosis (7, 34, 185)
Smerinthus ocellatus (L.)
Polyhedrosis (7, 47, 182, 185, 198, 254)

Sphinx ligustri L., privet hawk moth
Nuclear polyhedrosis, in mixed infection with cytoplasmic polyhedrosis, apparently as a result of cross-infection with viruses from several other insects (163, 171, 177)
Cytoplasmic polyhedrosis (177, 244)

THAUMETOPOEIDAE

Thaumetopoea pityocampa Schiff.
Nuclear polyhedrosis (216, 218)
Thaumetopoea processionea L.
Nuclear polyhedrosis (217)
Cytoplasmic polyhedrosis (221)

TINEIDAE

Tinea columbariella Wocke
Polyhedrosis (77)
Tinea pellionella (L.), casemaking clothes moth
Nuclear polyhedrosis, as a result of cross-infection with polyhedra from *Tineola bisselliella* (168, 171)
Cytoplasmic polyhedrosis (168)
Tineola bisselliella (Hum.), webbing clothes moth
Nuclear polyhedrosis, in some cases in mixed infection with cytoplasmic polyhedrosis (7, 18, 119, 170, 171, 174, 182, 190, 210, 254)

TORTRICIDAE

(See also OLETHREUTIDAE and PHALONIIDAE)

Acleris variana (Fern.), black-headed budworm
Nuclear polyhedrosis (88, 185, 254)
Amelia pallorana (Rob.)
Granulosis (192)
Argyrotaenia velutinana (Wlk.), red-banded leaf roller
Granulosis (18, 155, 157, 187, 190, 192, 229)
Cacoecia murinana (Hbn.), fir shoot roller
Polyhedrosis (113, 115, 192, 232)
Granulosis (11, 13, 16, 18, 185, 190, 234, 242, 254)
Choristoneura fumiferana (Clem.), spruce budworm
Nuclear polyhedrosis (12, 13, 15, 16, 18, 31, 242)
Cytoplasmic polyhedrosis (31, 87)
Granulosis (15, 16, 18, 86, 185, 242)
Homona coffearia Nietn., tea tortrix
Polyhedrosis (185, 196)
Tortrix loeflingiana L.
Polyhedrosis (231)
Tortrix viridana L.
Polyhedrosis (231)

ZYGAENIDAE

Harrisina brillians B. & McD., western grape leaf skeletonizer
Granulosis (18, 178, 190, 193)

ORTHOPTERA

GRYLLIDAE

Acheta domestica (L.), house cricket
Unidentified bodies in blood resembling virus inclusion bodies (89)

COLEOPTERA

CERAMBYCIDAE

Batocera (*Batocera*) *lineolata* Chevrolat, white-striped longicorn
Virus disease, not further identified (92)

DERMESTIDAE

Anthrenus museorum (L.)
Polyhedrosis (7, 47, 182, 185, 198)
Dermestes lardarius L., larder beetle
Polyhedrosis, reported to have resulted from cross-infection with polyhedra from *Bombyx mori* (7, 47, 182, 185, 198, 210)

HYMENOPTERA

APIDAE

Apis mellifera L., honey bee
"Paralysis" of honey bee, a noninclusion virus disease (41, 42, 43, 185)
Sacbrood, a noninclusion virus disease (7, 70, 96, 108, 182, 185, 186, 189, 190, 198, 208, 235, 236, 254)

DIPRIONIDAE

Diprion (*Gilpinia*) *hercyniae* (Hartig) [=*Lophyrus Hercyniae* Hartig; = *Diprion polytoma* (Hartig) *partim*], European spruce sawfly
Nuclear polyhedrosis of midgut cells; also reported to be susceptible to polyhedrosis of *Neodiprion pratti banksianae* (5, 6, 13, 15, 16, 18, 24, 25, 26, 27, 29, 57, 67, 145, 146, 185, 189, 191*a*,*b*, 254)
Diprion nipponica (Rohwer), black-spotted pine sawfly
Virus disease, not further identified (92)
Diprion pallida (Klug)
Nuclear polyhedrosis of midgut cells (6, 185)
Diprion pini (L.)
Nuclear polyhedrosis of midgut cells (6, 185)
Diprion (*Gilpinia*) *polytoma* (Hartig)
Nuclear polyhedrosis of midgut cells (6, 185)
Neodiprion abietis (Harr.) (=*Lophyrus abietis* Harr.), balsam-fir sawfly
Polyhedrosis (185)
Neodiprion lecontei (Fitch) (=*Lophyrus Lecontei* Fitch), red-headed pine sawfly
Polyhedrosis (187)

Neodiprion mundus Rohwer [=*Neodiprion* (*Neodiprion*) *mundus* Rohwer]
Polyhedrosis (192)
Neodiprion nanulus Schedl, red-pine sawfly
Polyhedrosis, apparently as a result of cross-infection with polyhedra from *Neodiprion pratti banksianae* (29)
Neodiprion pratti banksianae Rohwer
Nuclear polyhedrosis of midgut cells (29, 32)
Neodiprion sertifer (Geoff.) [=*Tenthredo sertifera* Geoff.; =*Lophyrus rufus* (Latr.)], European pine sawfly
Virus disease, not further identified (92)
Nuclear polyhedrosis of midgut cells; also susceptible to polyhedrosis of *Neodiprion pratti banksianae* (6, 7, 16, 18, 28, 29, 30, 39, 163, 185, 191*a*,*c*, 242, 254)
Neodiprion taede taede Ross [=*Neodiprion americanum* (Leach) Hetrick], loblolly-pine sawfly
Polyhedrosis (94, 187)

PAMPHILIIDAE

Acantholyda (*Itycorsia*) *nemoralis* C. G. Thomson [=*Lyda stellata* (Christ.); =*Tenthredo pratensis* F.]
Possible polyhedrosis (185)
Cephaleia (*Cephaleia*) *abietis* L. (=*Lyda hypotrophica* Hartig; =*Lyda campestris* Fallén *non* L.)
Polyhedrosis (154*a*)
Cephaleia (*Cephaleia*) *alpina* Klug (=*Cephaleia lariciphila* Wachtl.)
Polyhedrosis (37, 154)

TENTHREDINIDAE

Pristiphora erichsonii (Hartig) (=*Nematus Erichsonii* Hartig), larch sawfly
Polyhedrosis (185)
Nematus olfaciens Benson, black currant sawfly
Nuclear polyhedrosis (168)

DIPTERA

CALLIPHORIDAE

Calliphora vomitoria (L.), bluebottle fly
Polyhedrosis (7, 47, 182, 185, 198)

CECIDOMYIIDAE
(See ITONIDIDAE)

CHIRONOMIDAE
(See TENDIPEDIDAE)

DROSOPHILIDAE

Drosophila fasciata Meig. [=*Drosophila melanogaster* (Meig.)]
Virus "σ" (117, 148)

ITONIDIDAE

Contarinia tritici (Kirby)
Polyhedrosis (66, 185)
Sitodiplosis mosellana (Gehin), wheat midge
Polyhedrosis (66, 185)

TENDIPEDIDAE

Chironomus tentans F.
Inclusions in the cytoplasm of fat cells not bearing very strong resemblance to typical polyhedra (185, 230)

TIPULIDAE

Tipula (*Tipula*) *paludosa* Meig., leatherjacket
Polyhedrosis; inclusions not bearing very strong resemblance to typical polyhedra (151, 165, 166, 167, 176, 185)
Noninclusion virus disease (245)

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